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PRAGMA'S

PRODUCT PROFILES

News and Information for Pick™ Operating System Users

Issue Number 26

May 1986

```
001 A
002 0
003 %UT
004
005
006
007 F7;12;C5;*;/
008
009 R
010 3
```

```
 STAT-FILE.  USER.....  NAME.........  FRAMES  %UT

 1:113       SIGNAL     SUB*SUB        15,483   76
 2:129       SIGNAL     BTREE*BTREE     2,728   80
 1:25        MIKE       SUB*SUB         2,548   64
 3:131       SIGNAL     NEW*NEW         2,007   63
 1:19        MIKE       ZIP*ZIP           916   73
 1:17        MIKE       BTREE*BTREE       423   59
 1:37        COMICS     IH*IH             380   66
 1:92        ERRMSG     ERRMSG            313   91
             -          LOG*LOG           258   65
             -          BUN*BUN           202   48
             -          BUN*BUN           199    0
             -          BP*BP             196   75
             A          SUB*SUB           192   60
```

```
FILE= SUB MODULO= 11 SEPAR= 1
FRAMES BYTES ITMS
     1   326   10 *>>>>>>>>>>
     2   684   16 *>>>>>>>>>>>>>>>>
     1   379   11 *>>>>>>>>>>>
     1   476    6 *>>>>>>
     1   334   10 *>>>>>>>>>>
     1   435   11 *>>>>>>>>>>>
     2   601   13 *>>>>>>>>>>>>>
     2   554   10 *>>>>>>>>>>
     2   528   12 *>>>>>>>>>>>>
     2   535   11 *>>>>>>>>>>>
     1   421   10 *>>>>>>>>>>
    16
```

How To Find Wasted Disk Space

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How To Find Wasted Disk Space

Sooner or later, the disk in a Pick computer will appear to fill up with data and run out of available space. Usually a large portion of the disk is actually still unused, because of inefficiently allocated files. This article describes how to find that unused, wasted disk space and free it up for storing more data.

The first step towards cleaning up a Pick disk is to determine just how much space the operating system thinks is still left on the disk. The WHAT verb in some Pick implementations will display the total number of unused, available disk *frames,* where each frame holds 500 *bytes* (characters) of data. If the WHAT command is insufficient, give the POVF command to display both the total number of unused contiguous frames and the total number of unused linked frames (if any), which together are the total number of unused, available frames on the disk. Divide the total of these unused frames by the number of all frames on the disk (which is also shown by the WHAT verb) to determine the percentage of unused disk space. For example, 4995 unused frames divided by 36392 total disk frames indicates that 14% of the disk is still left for future files or intermediate data such as the select lists temporarily created by the operating system during sorts.

If your percentage of available disk space is a large, comfortable amount, then searching for wasted disk space is probably not yet worth the effort. But if your calculations indicate that disk space is close to running out, it's time to do some housecleaning. The next step is to examine the statistics in the STAT-FILE to determine just how efficiently the disk is being used, and where the waste is. After doing a FILE-SAVE, give the command SORT STAT-FILE BY-DSND FRAMES NAME FRAMES %UT to show all files, largest file first. (Your system may require a command using slightly different dictionary words for file names and their frame counts.) The %UT dictionary word should be defined as

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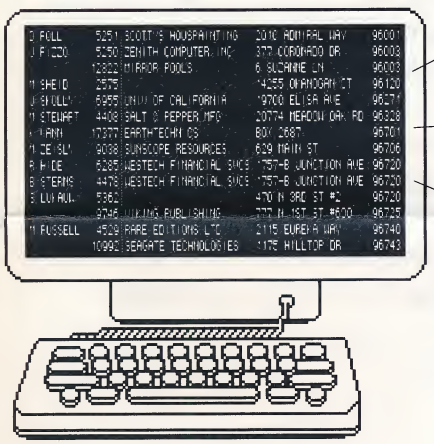

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```
    %UT
001 A
002 0
007 F7;12;C5;*;/
009 R
010 3
```

in order to divide the file's actual byte count by the total bytes available in all the file's frames, thereby showing "percent utilization", or how full the file's frames are with data. Since each frame in a file uses up 500 bytes of disk space, whether or not the frame holds any data, files with a low %UT are space wasters, and can probably be adjusted to free up some of those unused frames. Files with a high %UT are already using their frame space efficiently, and are probably best left alone.

When a file is created, a required parameter called the *modulo* specifies how many initial disk frames are to be allocated for the file's data. As items are stored in the file, a frame will eventually fill up, so an additional frame is "linked" on to the full frame to provide more space for the file's items. Each initial frame with its linked extension frames is called a *group*. The current state of a file and its groups can be displayed at any time as a histogram by using the ISTAT command:

```
FILE=BP MODULO=5 SEPAR=1
FRAMES BYTES ITMS
     1    389    2 *>>
     1      0    0 *
     2    631    3 *>>>
     5   2153    2 *>>
     3   1298    1 *>
    12
```

Each row of the histogram represents one group in the file, and the number of groups is always equal to the file's modulo. From left to right, the columns on the left side of the histogram indicate the number of frames, bytes, and items in each group. The total frames consumed by the file is shown at the bottom of the frames column. A right angle bracket (>) represents each item in the file. In the above example, the file consists of five groups. The first group uses one frame to hold two items totaling 389 bytes, the second group consists of one empty frame with no items, the third group needs two frames to hold three items made of 631 bytes, the fourth and

largest group occupies five frames holding two items totaling 2153 bytes, and the last group has three frames and one 1298-byte item, so the file requires 12 frames all together.

In an ideally allocated file, items are evenly spread amongst all groups in the file. But in actual practice, the random nature of file data causes some items to gang up in some groups while leaving other groups completely empty. Or, because the data in the file has grown or shrunk over time, the file's modulo

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may no longer be optimum. In that case, it can be adjusted to free up wasted disk frames.

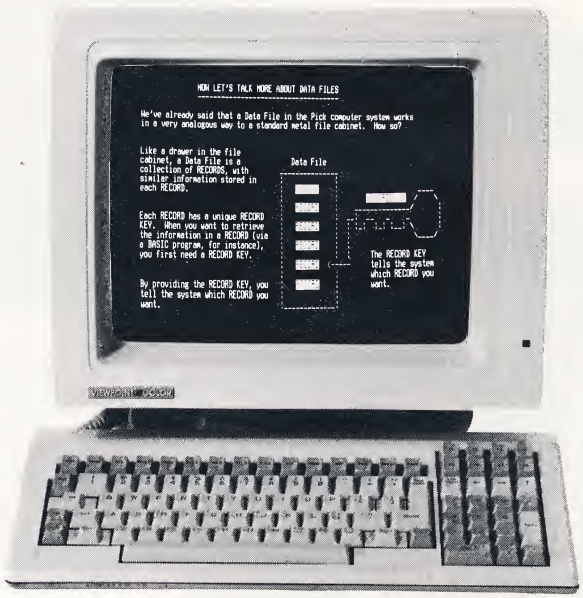
The best way to experiment with alternative modulos in order to remove unused frames from files is to use the HASH-TEST verb. HASH-TEST outputs the same histogram as ISTAT, but accepts any suggested modulo for the file in order to show how frame usage in the file would change. For example, if we use HASH-TEST on our example BP file, but specify a test modulo of 3, the histogram becomes:

```
FILE=BP MODULO=3 SEPAR=1
FRAMES BYTES ITMS
     4   1687   3 *>>>
     2    631   3 *>>>
     5   2153   2 *>>
    11
```

So HASH-TEST shows that if we re-create our BP file with a modulo of 3 instead of 5, the file ends up using only 11 frames instead of 12, thereby making 500 more bytes of disk space available for other purposes. For large files with lots of groups, the savings revealed by HASH-TEST can be considerable. (Use the S option when trying HASH-TEST on files with large modulos in order to suppress the histogram and avoid paging through a long listing before getting to the frame total at the end of the report.)

Of course, a modulo of one guarantees the minimum number of frames per file since all items get packed into one giant group, but the average frames per group should be kept as small as possible to minimize excessive disk access. Since the operating system must search sequentially through items in a group by reading the disk frame by frame to find one particular item, having too many items and frames in a group slows down system throughput considerably. Therefore, create files with an initial modulo equal to the total bytes in a file after dividing by 500, or equal to the number of items in the file, whichever is smaller. Then use HASH-TEST to experiment with other nearby alternative modulo values to see if a slightly smaller or larger modulo might be a better choice because it reduces the total number of frames in the file, while still keeping a small number of frames per group. Δ

The Password Is Prof



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